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Proceedings of the PSARC Groundfish Subcommittee Meeting May 20, 2003

Procès-verbal de la réunion du sous-comité du poisson de fond du CEESP, le 20 mai 2003

May 20, 2003
Nanaimo, B.C.

J. Fargo and S. Romaine
Groundfish Subcommittee Chairs

Fisheries and Oceans Canada
Pacific Scientific Advice Review Committee
Pacific Biological Station
Nanaimo, British Columbia V9T 6N7

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PACIFIC SCIENTIFIC ADVICE REVIEW COMMITTEE (PSARC)
GROUNDFISH SUBCOMMITTEE MEETING

SUMMARY 2

SOMMAIRE 2

INTRODUCTION 3

DETAILED COMMENTS FROM THE REVIEW 3

G2003-04: Stock Assessment Framework for Strait of Georgia Lingcod 3

APPENDIX 1. WORKING PAPER SUMMARY 9

APPENDIX 2: PSARC GROUNDFISH SUBCOMMITTEE MEETING AGENDA MAY 20, 2003 10

APPENDIX 3. LIST OF ATTENDEES 11

SUMMARY

The PSARC Groundfish Subcommittee met May 20, 2003 to consider a Working Paper that describes a stock assessment framework for lingcod in the Strait of Georgia. New resources have now been allocated and a framework including surveys and tagging is outlined. This follows the Department's commitment in 2001 to rebuild lingcod stocks in the Strait of Georgia.

Working Paper G2003-04: Stock Assessment framework for Strait of Georgia Lingcod

The Subcommittee agreed with the recommendations in the working paper and acknowledged that the development of a management framework for Strait of Georgia is the next step in this process. Rebuilding targets should be specified in that document.

The Subcommittee accepted the use of the handline and bottom trawl surveys for estimating and monitoring the relative abundance of lingcod in the Strait of Georgia as presented in Table 1 (see page 8).

The Subcommittee accepted the use of archival and conventional tagging to track lingcod migration and estimate recreational fishing recapture rates, respectively.

SOMMAIRE

Le sous-comité du poisson de fond du CEESP a tenu une réunion le 20 mai 2003 afin d'examiner un document de travail décrivant un cadre d'évaluation des stocks de morue-lingue dans le détroit de Georgia. De nouvelles ressources sont maintenant disponibles et un cadre comprenant des données de relevés et de marquage est établi. Ceci fait suite à l'engagement que le Ministère a pris en 2001 en faveur du rétablissement des stocks de morue-lingue dans le détroit de Georgia.

Document de travail G2003-04 : Cadre d'évaluation des stocks de morue-lingue dans le détroit de Georgia

Les membres du sous-comité sont d'accord avec la recommandation du document de travail et reconnaissent que l'élaboration d'un cadre de gestion s'appliquant au détroit de Georgia constitue la prochaine étape du processus. Les objectifs de rétablissement devraient être précisés dans ce document.

Les membres du sous-comité acceptent l'utilisation de relevés au chalut de fond et à la ligne à main pour estimer et surveiller l'abondance relative de la morue-lingue dans le détroit de Georgia, tel que présenté dans le tableau 1 (voir page 8).

Les membres du sous-comité acceptent également l'utilisation du marquage d'archivage et traditionnel afin, respectivement, de suivre la migration de la morue-lingue et d'estimer le taux de recapture dans le cadre des pêches récréatives.

INTRODUCTION

The PSARC Groundfish Subcommittee met May 20, 2003, at the Pacific Biological Station in Nanaimo, British Columbia. External participants from the Sport Fishing Advisory Board, Malaspina University College, Canadian Groundfish Research Conservation Society, and Cowichan Tribes attended the meeting. The Subcommittee Chairs, J. Fargo and S. Romaine opened the meeting by welcoming the participants. During the introductory remarks the objectives of the meeting were reviewed, the confidential nature of the discussion was highlighted, and the Subcommittee accepted the meeting agenda.

The Subcommittee reviewed one Working Paper. A Summary of the Working Paper is in Appendix 1. The meeting agenda appears as Appendix 2. A list of meeting participants, observers and reviewers is included as Appendix 3.

DETAILED COMMENTS FROM THE REVIEW

G2003-04: Stock Assessment Framework for Strait of Georgia Lingcod

J.R. King, G.A. McFarlane, and A.M. Surry

Both reviewers felt that the working paper clearly stated its purpose as providing background information that would be necessary to develop a monitoring program for relative abundance of the Strait of Georgia lingcod stock. The first reviewer suggested that traditional measures of relative abundance using fishery-dependent CPUE are no longer available due to commercial and recreational fishing closures. Therefore, it was apparent that the working paper was not a stock assessment *per se,* but rather a compilation of data for Strait of Georgia lingcod, followed by a rationale for using different measures of relative abundance for future research.

The second reviewer stated that declining commercial catch (Fig. 1 in the working paper) and recreational catch (Fig. 2 in the working paper) is difficult to interpret without corresponding effort data and in itself does not support a conclusion of dramatically reduced relative abundance. This reviewer suggested that CPUE from handline surveys might be more informative. He also suggested that age composition data could be used to estimate the total mortality rate. The authors responded that age composition data were not available for recent years and that the paper was not a stock assessment but provided the framework for improving Strait of Georgia lingcod stock assessment.

The first reviewer asked for clarification as to why the recreational lingcod landings more than doubled in 1984. They felt that if size and age composition data were available they might show that a strong year class was recruiting at that time. The author could not explain the increase in lingcod landings in 1984 but stated that corroborating evidence of a strong year class did not exist in the data in succeeding years.

The first reviewer was skeptical of the use of mean CPUE in recreational and research fishing on a stock that is very low in abundance that you undoubtedly get a lot of "0's" in the data set. It was suggested that the data be parsed of "0's" and the median CPUE be determined for those proportion-positive trips as an alternative.

It was suggested that lingcod biology also be a consideration in survey design. Lingcod typically do not "school" like some rockfish, although the young-of-the-year could be aggregating. Maturing males obviously have a "space" that they maintain prior to the females arriving and during nest guarding (and perhaps during other times of the year). These characteristics all point to the probability that the pattern of distribution of lingcod may be density-dependent. With density-dependent distributions you may actually be able to detect smaller changes in relative increases in lingcod abundance in habitat that is next to "optimal" habitat. This reviewer cautioned not to be too restrictive in trawling, especially with regard to habitat type.

The first reviewer felt that a simulation model could be used to estimate what kind of increase in the stock would be needed for recovery and when you have obtained the goal of recovery (i.e., set a target). The authors commented that a simulation model for lingcod had been developed and would be used in this way.

It was suggested that if possible daily rings of juveniles could allow back-calculation of when fish actually hatched. This may identify peak hatching times versus an extended, continuous hatching period. This information could be used to improve the timing in surveying nests. The authors reported that based on dive surveys, peak hatching periods had already been adequately identified.

The first reviewer suggested that a tag shedding study over a range of fish sizes be conducted prior to archival tagging. As well, working in an open system, you would not be able to assume that lingcod that were not recaptured more than once were actually still in the area and available for recapture (i.e., they may move out of the area and therefore would not have a chance of being recaptured). This reviewer suggested combining a recapture estimate with an emigration estimate. The authors noted that the archival tagging study's objective was to quantify seasonal migration patterns of lingcod, not to estimate migration rates. As such, considerations of tag shedding and migration out of the system do not need to be incorporated into the study.

The first reviewer thought that the Ecosystem Dynamics section of the paper was very important. However, instead of viewing it as "investigating the effects on other species of increasing or decreasing lingcod abundance", turn it around and ask "what effects do

increasing or decreasing abundance of other species have on lingcod abundance?" For example, what affect does increasing or decreasing predation by dogfish or seals have on the abundance of lingcod? What affect does reducing a major prey species for lingcod (i.e., herring) have on lingcod abundance, etc.? These could all have an affect on the potential recovery of the lingcod stock but some may have more of a major forcing effect than others. This may provide insights into where future efforts should be directed. The authors noted that they had captured these considerations when suggesting that sources of natural mortality (predation, prey availability and ocean-climate influences on recruitment) should be investigated.

The second reviewer suggested that the recommendations in the document were presented in a useful manner and the advice reflected the uncertainty in the data. However, this reviewer suggested that the proposed research does not address estimates of mortality rate, recruitment into the fishery, or absolute abundance, all of which are required to adequately manage the lingcod fishery. The proposed research will give estimates of relative abundance, although the variability advocated with the data may render it inconclusive. The reviewer stated that lingcod have a highly heterogeneous distribution which varies not only with habitat but also between year classes. Thus, sampling must be highly stratified to reduce variability. In the trawl survey, the use of specific GPS tracks at specific times of the year may help decrease error. Also, focusing on a single substrate and increasing sample size for that substrate may decrease the coefficient of variation noted in Table 4 of the working paper.

The second reviewer suggested that DFO consider working with stakeholders to establish an "index reef" research approach to complement the proposed assessment. By conducting concentrated mark-recapture studies on several reefs in the study area absolute estimates of abundance can be obtained as well as information on mortality rates, immigration and emigration, and the rate at which juvenile lingcod recruit onto the reef habitat. Combined with habitat mapping, the relative abundance derived from this type of research could be extrapolated into absolute abundance. The reviewer felt that many recreational guides and fishers would be willing to participate in such an exercise and if conducted over a sufficient time period, it would provide a long term multiple mark-recapture data base that would complement the proposed relative abundance surveys.

The second reviewer questioned why effort data weren't sufficient to calculate CPUE for the handline surveys. The authors noted that effort data for the handline surveys are available and there is a CPUE index for the handline surveys. However, effort was not recorded for the tagging surveys.

The second reviewer also stated that the proposed research does not address estimates of mortality rate, recruitment into the fishery or absolute abundance, all of which are required to adequately manage the lingcod fishery. The authors noted that in fact mortality rate from catch curves and relative recruitment from young of year surveys can be estimated. Tagging in the hook and line survey would enable for

absolute abundance estimates, however habitat mapping would be required and is approximately five years away from being completed.

Subcommittee Discussion

There was discussion on relative versus absolute estimates of abundance. In light of the problems involved with using only CPUE data it was suggested that an absolute estimate based on mark-recapture results in the Strait of Georgia could be compared with abundance estimates on the west coast of Vancouver Island, an area where stocks are considered to be more abundant. There was discussion about the use of one bait type and it was suggested the surveys compare the use of frozen with live bait. The authors noted that this comparison had already been undertaken in previous surveys. In addition, at individual tagging sites it would be possible to compare changes in CPUE over time with the mark-recapture population estimates. The author cautioned that a large amount of fishing effort will be required to make a significant number of recoveries. The second reviewer further explained the use of the Jolly-Seber analysis in the Mark recapture program as a method to estimate abundance. The Subcommittee noted that in order to be able to extrapolate abundance estimates from index sites to larger areas, habitat mapping will be required. A habitat mapping program is currently underway however results are expected in five years.

It was suggested that habitat mapping will be important for determining the areas that lingcod will cue to but that this is a number of years away. The concept of index reefs for tracking the number of lingcod per area was discussed and these could be tied to habitat mapping as well.

There were comments on the bottom trawl survey design and that the number of tows required may be underestimated. There was a note of caution about the use of index trawl locations and that the short-term benefits might be less than the long-term costs. There was also discussion on the depth intervals for the hook and line surveys. The authors had suggested removing the deeper depth strata used in earlier surveys (71-100 m) but it was felt that the deeper strata should be retained due to possible seasonal movements and that consideration of alternate bait be incorporated into the survey design.

It was suggested that available base-line data on seal and sea lion populations and possible predation on lingcod should be presented in the paper.

The authors clarified the use of the archival tags. These tags will be used for tracking individual fish movements at both daily and annual intervals but will not be used for estimating abundance as in a mark-recapture program or in estimating migration rates. The issue of tag shedding can be addressed by double tagging these fish with floy anchor tags. There was discussion on the number of tags being deployed (80) and expected recovery rates. The authors felt that a minimum recovery would be about 10% or 8 tags and could possibly be greater. It was suggested that if available, information on other archival tagging studies should be incorporated into the paper.

The utility of historical landings data was discussed in the context of the current situation. The author presented the historical data in an attempt to catalog what has gone on before and as a starting point for moving forward. It was noted that the landings data are now as complete as possible. It was also noted that possibly favourable conditions for lingcod survival have arisen in recent years but corresponding increases in abundance have not yet been detected.

There was considerable discussion regarding the term "conservation-based management" and whether the current zero retention of lingcod was beyond this and actually "preservation-based management". The author commented that goal posts must be defined so that management actions can be determined for situations where the stock is above or below the defined levels (limit reference points). The Subcommittee acknowledged that the development of a management framework is the next step in the process.

Subcommittee Recommendations

1. The Subcommittee accepted the paper subject to revisions.
2. The Subcommittee accepted the use of the handline and bottom trawl surveys for estimating and monitoring the relative abundance of lingcod in the Strait of Georgia as presented in Table 1 (below).
3. The Subcommittee accepted the use of archival and conventional tagging to track lingcod migration and estimate recreational fishing recapture rates, respectively.

Table 1. Proposed timeframe for lingcod monitoring and research for 2003-2005.

Date	Survey or Project	Minor Statistical Areas
July-August 2003	Bottom trawl survey for young of year.	Areas 17 and 18
August-September 2003	Tagging projects (archival and recapture rate estimation). Involvement of recreational fishing community.	Selected in consultation with stakeholders.
October-November 2003	Handline surveys	Areas 14, 17, 18 and 19
March 2004	Collection of samples for genetic population analyses. Involvement of recreational fishing community.	Selected in consultation with stakeholders.
July-August 2004	Handline surveys	Areas 13, 15 and 16.
August-September 2004	Continue tagging projects (archival and recapture rate estimation). Involvement of recreational fishing community.	

APPENDIX 1. Working Paper Summary

G2003-04: Stock Assessment Framework for Strait of Georgia Lingcod
J.R. King, G.A. McFarlane, and A.M. Surry

This document outlines background information on lingcod biology, historical fishery and abundance trends of Strait of Georgia lingcod and sources of historical and current biological information on Strait of Georgia lingcod and develops monitoring and assessment programs for these populations. The paper presents an extensive review of all research activities that have been conducted on Strait of Georgia lingcod along with discussion on their suitability for providing baseline biological and relative abundance data.

Several types of surveys have been conducted on all life stages of lingcod, from purse seining for post-larval lingcod, to bottom trawling for young of year or juvenile lingcod, to handline, SCUBA or submersible surveys on age-2+ lingcod. Based on the results and conclusions of previous research surveys, along with sampling logistics, it is recommended that two types of surveys be implemented to provide information on the relative abundance of Strait of Georgia lingcod: 1)-bottom trawl surveys for young of year lingcod to estimate relative yearclass success; 2)-handline surveys for age-2+ lingcod to estimate the relative abundance of lingcod at index sites throughout the Strait of Georgia. Baseline information from similar surveys conducted in the past will provide points of reference to which future survey results can be compared. In addition to surveys, research projects investigating seasonal migration, recreational fishing recapture rates, population structure and Strait of Georgia ecosystem dynamics are recommended.

APPENDIX 2: PSARC Groundfish Subcommittee Meeting Agenda May 20, 2003

DRAFT AGENDA
PSARC GROUNDFISH SUBCOMMITTEE
May 20, 2003
Pacific Biological Station
Seminar Room - Nanaimo, B.C.

Tuesday, May 20, 2003

Lingcod Stock Assessment Framework	9:00am
Lunch	12:00
Lingcod Framework Cont'	1:00
Subcommittee Conclusions and Recommendations	3:00
Adjournment	4:30

APPENDIX 3. List of Attendees

Subcommittee Chair: Jeff Fargo and Steve Romaine
PSARC Chair: Al Cass

DFO Participants	Tuesday
* Subcommittee Members	
Cass, Al	✓
Fargo, Jeff*	✓
Haigh, Rowan*	✓
King, Jackie*	✓
Krishka, Brian	
Lacko, Lisa	✓
MacDonald, Allan*	✓
Romaine, Stephen	✓
Rutherford, Kate	✓
Schnute, Jon	✓
Shaw, Bill	✓
Stanley, Rick*	✓
Surry, Maria	✓
Yamanaka, Lynne*	✓
External Participants:	
Furnell, Don	✓
Harling, Wayne	✓
La Boucan, Guudliniia	✓
Maynard, Jeremy	✓
Mose, Brian	✓
Murphy, Marilyn	✓
Turris, Bruce	✓

Reviewers for the PSARC papers presented at this meeting are listed below, in alphabetical order. Their assistance is invaluable in making the PSARC process work.

Furnell, Don	Malaspina University College
Murie, Debra	University of Florida